REMARKS

Claims 1, 2, 4-26 and 35-38 are pending. In the present response, Applicants have amended Claims 1, 4 and 9. The amendments add no new matter and are fully supported by the specification as originally filed. Applicants have cancelled Claims 2 without prejudice to, or disclaimer of, the subject matter contained therein. Applicants maintain that the cancellation of a claim makes no admission as to its patentability and reserve the right to prosecute the subject matter of the cancelled claim in this or any other application.

Claims 1, 2, 4, 7 and 8 were examined and are rejected by the Examiner in the Office Action. Applicants respond below to the specific rejections raised by the Examiner. For the reasons set forth below, Applicants respectfully traverse.

Rejections under 35 U.S.C. § 112

The Examiner has rejected Claims 4, 7, and 8 under 35 U.S.C. § 112, second paragraph, as being allegedly indefinite for depending from the cancelled Claim 3.

Applicants have amended Claim 4 to depend from pending Claim 1. In view of the amendment to Claim 4, Applicants respectfully request withdrawal of the rejection.

Rejection Under 35 U.S.C. § 103(a)

Claims 1, 2, and 4

The Examiner has rejected Claims 1, 2, and 4 under 35 U.S.C. § 103(a) as allegedly being unpatentably obvious over Ho et al. (2002) *Angew. Chem. Int.* 41:1548-1551 in view of Gold (1995) *JBC* 270:13581-13584. According to the Examiner, Ho et al. teach an optical sensor for detecting a target, wherein the optical sensor comprises a ssDNA complementary to the target, and the same, water-soluble, cationic polythiophene derivative of the formula shown in Claim 1. The Examiner concedes that Ho et al. do not specifically teach that the ssDNA of the optical sensor is an aptamer. However, the Examiner states that Gold teaches that aptamers are single-stranded DNA molecules that interact with target molecules and that aptamers are useful for detecting proteins. According to the Examiner, it would have been obvious for one skilled in the art to substitute the ssDNA in the polythiophene-ssDNA complex disclosed by Ho et al. by an ssDNA aptamer taught by Gold for the purpose of detecting target molecules.

Applicants respectfully disagree. It is well settled that the Examiner "bears the initial burden of presenting a *prima facie* case of unpatentability..." *In re Sullivan*, 498 F.3d 1345 (Fed. Cir. 2007). Until the Examiner has established a *prima facie* case of obviousness, the Applicant need not present arguments or evidence of non-obviousness. In order to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a), the Examiner must clearly articulate reasons why the claimed invention would have been obvious, with some rational underpinning to support the legal conclusion of obviousness, and taking into consideration how a person of ordinary skill would have understood the prior art teachings. *See,* M.P.E.P. §2141. Further, the art must be such that the skilled artisan would have a reasonable expectation of success at practicing the claimed invention. As explained below, the Office Action mailed September 11, 2009 fails to establish that Claims 1 and 4 are *prima facie* obvious over Ho et al. and Gold since the references would not provide the skilled artisan with any expectation of successfully modifying the cited references to arrive at Applicants' presently claimed invention.

Ho et al. teach that polythiophene derivatives can be used to detect specific single-stranded oligonucleotides by using a polythiopehene derivative and a "capture probe" that is a single stranded oligonucleotide that is substantially complementary to the target ssDNA In particular, Ho et al. teach the use of water-soluble polythiophene derivatives to " transduce **oligonucleotide hybridization with a specific 20-mer capture probe** into a clear optical (colorimetric or fluorometric) output." *See* Ho et al. p.1549, first column (emphasis added). Ho et al. specifically teaches that the underlying principle behind the usefulness of polythiophene derivatives as reagents to detect hybridization events is that the electrostatic interactions and conformational structures formed when the polythiophene derivatives are in contact with the single-stranded oligonucleotides (the "capture probe") differ from the electrostatic interactions and conformational structures formed when the polythiophene derivatives are in contact with double-stranded (hybridized) nucleic acids, *i.e.*, in the presence of a target hybridizes to the capture probe. Specifically, Ho et al. teach that the UV/vis absorbance and the fluorescent properties of the polythiophene derivatives change when in the presence of ssDNA versus dsDNA: The measurable changes in the absorption spectrum of the polythiophene derivatives in the presence of ssDNA or dsDNA are **"based on different electroactive and conformational structures between electroactive and photoactive poly(3-alkoxy-4-methylathiophen)s and**

single stranded oligonucleotides or double stranded (hybridized) oligonucleotides." Ho et al., p. 1549, first column.

As such, in the method of Ho et al. polythiophene derivatives are reacted with a single stranded DNA (ssDNA) capture probe that is a 20-mer oligonucleotide, in the presence or absence of substantially complementary ssDNA targets. According to Ho et al., when the polythiophene derivatives are contacted with a ssDNA capture probe, a polythiophene/ssDNA "duplex" is formed, which has a characteristic UV absorption spectra. When the polythiophene derivatives are contacted with a ssDNA capture probe that hybridizes to a ssDNA target, a polythiophene/dsDNA "triplex" is formed, which has different absorbance (and fluorescent) properties. In other words, the teachings of Ho et al. teach that the hybridization of the capture probe and target to form a dsDNA is essential for the detection via the polythiophene derivative. Accordingly, at most, one skilled in the art would conclude from Ho et al. that the polythiophene derivatives could be used to detect ssDNA targets that hybridize to the capture probe/aptamer.

As amended, Claim 1 is drawn to optical sensors for the detection of potassium ions, small organic molecules, amino acids, proteins, whole cells and nucleotides. None of the "targets" recited in Applicants' claims form dsDNA in the presence of a ssDNA aptamer. As such, they would not form a polythiophene/hybridized nucleic acid triplex, and the skilled artisan would have no reason to expect that their presence could be detected by an optical sensor comprising a polythiophene derivative and a ssDNA aptamer, given the teachings of Ho et al., which merely teaches that the optical properties of polythiophene derivatives change in the presence of ssDNA versus dsDNA. Accordingly, one skilled in the art would not have had a reasonable expectation of success in using the polythiophene derivatives for the purpose to detect the targets recited in amended Claim 1.

The teachings of Gold do not cure the deficiencies of Ho et al., since, like Ho et al., Gold does not provide any reasonable basis to expect that optical sensors comprising polythiophene derivatives and a single stranded aptamer can be used to detect targets such as potassium ions, small organic molecules, amino acids, proteins, whole cells and nucleotides. Gold merely teaches that aptamers are ssDNA molecules that can bind specific target molecules. Gold is completely silent about polythiophene derivatives. Thus, Gold does not provide the skilled artisan with any reason to expect that polythiophene derivatives can be used in any way.

In view of the foregoing, Applicants respectfully submit that the teachings of Ho et al. and Gold do not provide the skilled artisan with any reason to expect that polythiophene derivatives can be used in optical sensor to detect targets such as potassium ions, small organic molecules, amino acids, proteins, whole cells and nucleotides. As such, the references cannot support a *prima facie* case of obviousness under 35 U.S.C. § 103(a). Applicants respectfully request reconsideration and withdrawal of the rejection accordingly.

Claims 7 and 8

The Examiner has rejected Claims 7 and 8 under 35 U.S.C. § 103(a) as allegedly being unpatentably obvious over Ho et al. and Gold as applied to Claims 1, 2, and 4, and further in view of Michaud et al. (2004) *Analytical Chemistry* 74:1015-20. The Examiner states that Michaud et al. teach a D-adenosine-specific aptamer having the exact sequence of SEQ ID NO:3, and asserts that it would have been obvious to one skilled in the art to use the D-adenosine-specific ssDNA aptamer as taught by Michaud et al. in a polythiophene-ssDNA optical sensor. Applicants respectfully traverse the rejection.

As set forth above, the teachings of Ho et al. and Gold do not provide the skilled artisan with any reason to expect that polythiophene derivatives can be used to detect anything other than ssDNA targets that will hybridize to a complementary or substantially complementary ssDNA capture probe/aptamer. Michaud et al. disclose the use of DNA aptamers in performing enantiomeric separations and teach an oligonucleotide that is an aptamer for D-adenosine. Michaud et al., as with Gold et al., is completely silent regarding polythiophene derivatives and their use as components of optical sensors. Therefore, Michaud et al. do not cure the deficiencies of Ho et al. and Gold et al. in providing the skilled artisan with a reasonable expectation of arriving at Applicants' claimed invention.

In view of the foregoing, Applicants maintain that the combined teachings of Ho et al., Gold, and Michaud et al. fail to support a *prima facie* case under 35 U.S.C. § 103(a). Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection.

No Disclaimers or Disavowals

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, the Applicants are not conceding in this application that previously pending claims are not patentable over the cited references. Rather,

any alterations or characterizations are being made to facilitate expeditious prosecution of this application. The Applicants reserve the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that the Applicants have made any disclaimers or disavowals of any subject matter supported by the present application.

CONCLUSION

In view of the above amendments and remarks, Applicants respectfully maintain that the claims are patentable and request that they be passed to issue. Applicants invite the Examiner to call the undersigned if any remaining issues may be resolved by telephone.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: April 7, 2009

By: Kathleen Mekjian

Kathleen R. Mekjian
Registration No. 61,399
Attorney of Record
Customer No. 20,995
(619) 235-8550

6903561
033109